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blank run with just 50% acetone/50% water. FIG. 15B shows the results of a test run with 1000 ppm UN in 50% acetone/50% water producing a red color. FIG. 15C shows the results of a test run with 1000 ppm urea in 50% acetone/50% deionized water.

Example 8

Referring to FIGS. 16A and 16B, single-channel PMDs were configured to test for RDX/HMX/PETN. FIG. 16A shows the results of a test run with 1000 ppm HMX in 50% acetone/50% water producing a pink color change. FIG. 16B shows the results of a test run with 1000 ppm potassium nitrate in 50% acetone/50% water producing a noticeably different orange color change.

All patents, patent applications, provisional applications, and publications referred to or cited herein are incorporated by reference in their entirety, including all figures and tables, to the extent they are not inconsistent with the explicit teachings of this specification.

It should be understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application.

What is claimed is:

1. A three-dimensional (3-D) paper microfluidic device (PMD), comprising:

a paper substrate folded into a 3-D configuration to give a plurality of layers;

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a plurality of channels on the paper substrate; and
a plurality of reservoirs on the paper substrate,
the paper substrate being folded such that each reservoir
lines up with a channel on a different layer of the paper
substrate than the reservoir is on, and
at least one reservoir comprising a test reagent configured
to test for explosives.

2. The 3-D PMD according to claim 1, each channel being
hydrophobic and each reservoir being hydrophobic, and
the test reagent being configured to test for at least one of
improvised explosives and homemade explosives.

3. The 3-D PMD according to claim 1, the volume of the
3-D PMD being less than 4 cubic centimeters (cc).

4. The 3-D PMD according to claim 1, comprising at least
three layers,

a top layer of the 3-D PMD comprising at least one
reservoir,

a bottom layer of the 3-D PMD comprising at least one
reservoir lined up with the at least one reservoir of the
top layer,

each layer between the top layer and the bottom layer
comprising a channel lined up with the at least one
reservoir of the top layer and the at least one reservoir
of the bottom layer, and

the at least one reservoir of the bottom layer comprising
a test reagent configured to test for at least one of
improvised explosives and homemade explosives.

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